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## A Survey on the Acceptance and the Use of HDR Photography Among Croatian Photographers

### Authors

Maja Strgar Kurečić\*, Ante Poljičak, Lidija Mandić

*University of Zagreb,  
Faculty of Graphic Arts,  
Croatia*

*\*E-mail: mstrgar@grf.hr*

### Abstract:

The emerging field of high dynamic range (HDR) imaging is directly linked to diverse existing disciplines such as radiometry, photometry, colorimetry and colour appearance - each dealing with specific aspects of light and its perception by humans. Although the idea is not new, it has not been widely used until just a few years ago when digital cameras gained popularity and the computers processing power increased significantly. Now this photographic technique is widely spread and used, but even more often – misused. A research was conducted by means of a questionnaire in order to get some actual information about how Croatian photographers see the HDR photography and how they employ it. The results of the survey proved that indeed a great interest exists in the technique, but that many photographers are scared away from the HDR photography because of the misconception that the artificial look is an unavoidable side effect of the HDR processing. The fact is, however, that the final HDR image is a result of the tone mapping process and post-corrections and adjustments, entirely dependent on the photographer's intent and vision, as well as his understanding of various adjustments available. The results of the questionnaire have also pointed out to other widely spread misconceptions which are discussed in this paper.

### Keywords:

Digital Photography, High Dynamic Range Photography, Tone Mapping

## 1. Introduction

A general problem in the photography has always been how to capture real world scenes which contain the range of luminance considerably exceeding the dynamic range capabilities of the camera (i.e. film or sensor) and output media (monitor, printer). Conventional photographic materials, just like digital image sensors, cannot match the dynamic range of a scene and can only capture a subset of luminance present. In most situations photographers face the dilemma – how to capture details in the shadows without obtaining blown-out highlights and vice versa. By choosing the right combination of aperture and exposure time, photographers control the amount of light reaching the sensor (or film) and actually select the subset of scene luminance they wish to capture. When the dynamic range of the scene is too large, it is not enough to simply adjust the exposure. Something always has to be sacrificed – either by giving up the details in the shadows or those in the highlights. Photographers have always been aspiring to resolve this problem, existing since the very advent of photography, with a handful of innovative methods and techniques, such as various darkroom techniques for the film (e.g. dodging and burning), graduated neutral density (GND) filters for in-the-field use, as well as a variety of digital post-processing techniques – one of which is High Dynamic Range processing.

High Dynamic Range is a set of techniques which allows a greater dynamic range of luminance between the darkest and the lightest areas of an image by merging several different exposures of the same scene, as shown in *Figure 1*. There are two aspects of creating HDR image: the capture of an HDR scene with conventional (LDR) photo camera by taking several different exposures of the same scene and merging them into a single HDR image using HDR software, and the second, a tone mapping process that reduces the dynamic range in an HDR image to produce a meaningful image on a monitor or print (*Reinhard, 2010*).

Even though the idea is not new; it has not been widely used until just a few years ago when digital cameras gained popularity and the computers processing power increased significantly. Until recently, a significant emphasis was on the *spatial* resolution of digital images. This trend can be witnessed in the evolution of digital cameras that feature sensors with higher and higher resolutions. Consequently, the quality of a camera is often measured in megapixels. But nowadays the focus is slowly shifting from spatial to *tonal* resolution and this is the point where high dynamic range imaging enters into the scene (*Asla, 2007*). This technique is widely spread and used, but even more often – misused. The problem that the HDR technique faces nowadays is not a technological problem, but the problem of misconceptions and bad public impression. It is a solid technique, but often used for wrong reasons and in a bad manner.

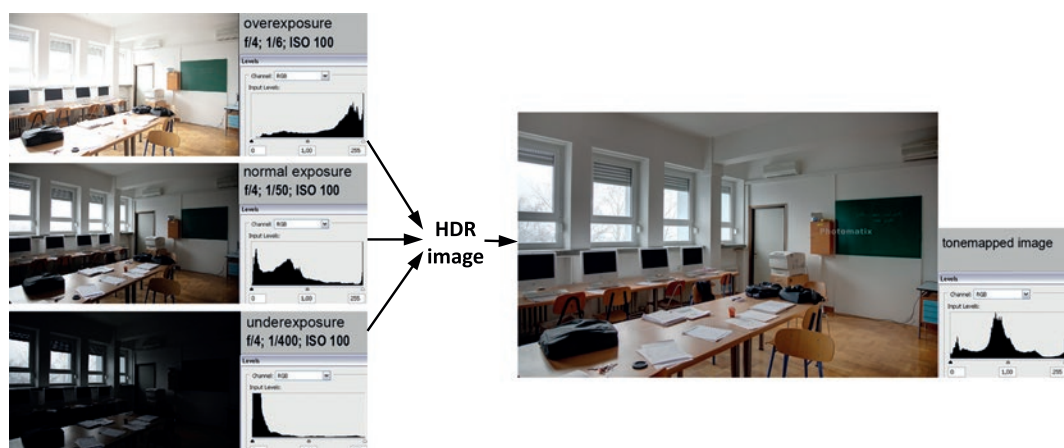


Figure 1. Image capturing, merging and tone mapping process

This paper deals with the impressions of HDR photography among photographers. It seems that all those involved in photography - both amateurs and professionals, have a certain attitude towards HDR photography. It is a highly debated topic on web blogs, photo club panels and round tables. Titles such as: *"Photorealism vs. surrealism"*, *"Is Velvet Elvis in the building"*, *"Exciting new frontier or gimmick to avoid"*, *"Photo technology porn"* can be found on the Internet and in photo magazines. When typing HDR into Google, it brings out huge amounts of surreal, overly coloured, crazy looking photographs, photographs resembling illustrations. There is a very large Flickr group for HDR which sets the trend of "the over the top the better". According to the Group *Trackr* it has 77689 members (Taraborelli, 2011). Overall population growth is shown in Figure 2.

From all those discussions and photographs one can get the impression that the use of the HDR technique is out of control. Instead of using it with the purpose it is supposed to have, it is in most cases used just to show off. The technique became the foundation of an image and its sole purpose.

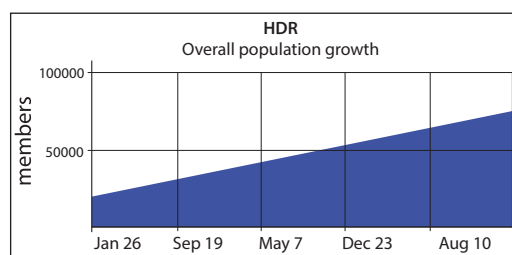


Figure 2. Growth statistics for public Flickr group for HDR (from 26<sup>th</sup> January 2008. to 24<sup>th</sup> March 2011.)

## 2. Research

The research was conducted by means of a structured non-disguised questionnaire with the aim of getting some actual information about how Croatian photographers see the HDR photography and how they employ it. Adequate questionnaire construction is critical to the success of a survey (Trochim, 2006), so special care was taken in preparing appropriate questions,

ordering them and scaling them, according to the research objectives. The questions used in the questionnaire were multiple choice responses. Only last question, which was not mandatory, was an open-ended question (*"what is your opinion about HDR photography"*), where the respondent is not constrained by a fixed set of possible responses.

The questionnaire was e-mailed to the respondents using the mailing lists of professional photographers from the Croatian Association of Artists of Applied Arts (ULUPUH) and the three largest photo clubs in the country (Fotoklub Zagreb, Fotoklub Split and Zagrebački foto-kino savez). More than a hundred replies arrived and were later classified into professional and amateur group.

## 3. Results and discussion

The first question was: *"Do you know what the HDR technique is?"* There was a set of three possible responses: *Yes*; *No*; *Roughly*. Most respondents (89%) answered that they know what the HDR technique is, while only 9% respond that they roughly know, and 2% that they do not know what the HDR technique is. They learned about the technique through the Internet (45%), books and magazines (29%), fellow photographers (12%), a photo club (9%) and expert lectures (5%). It was interesting to see that around half of the photographers respond that they use this technique occasionally (44%) and the other half (43%) that they have tried this technique out, but do not usually use it in their work. Only 2% of the respondents state that they always use this technique in their work; on the other side, 11% have not tried this technique at all. The distribution of answers according to the professional and amateur group is shown in Figure 3.

The question: *"For what field of photography do you think HDR is most applicable technique?"* demonstrated the largest differences in the responses of amateur and professional photographers, as shown in Figure 4. It is interesting to notice that only amateur photographers (7%)

stated that HDR could be used for every scene and subject, while professional photographers think that it is best suited for shooting architecture and interiors (48%), landscapes (35%) and advertising (17%). When answering the question: “When comparing HDR photograph with conventional (single exposure) photograph of the same (or similar) subject”, only 4% of the respondents stated that it looked more realistic, 27% responded that it looked more attractive, while other respondents had a negative impression of it (26% it looks artificially, 24% unrealistic, 19% exaggerated). In Figure 5, answers were classified into professional and amateur group, showing their distribution in more detail.

Except that, there is a great interest in the HDR technique, the results of the questionnaire have also pointed out to the wide spread misconceptions about HDR photography.

The most common misconception is that the artificial look is an unavoidable side effect of the HDR processing and that the HDR photography always looks fake. It is generally believed that HDR images have a certain “look” – the shadows full of detail and usually more colour than we would expect, unnaturally dark skies with stormy clouds and saturated colors, etc. However, the fact is that the final HDR image is a result of the tone mapping process. The

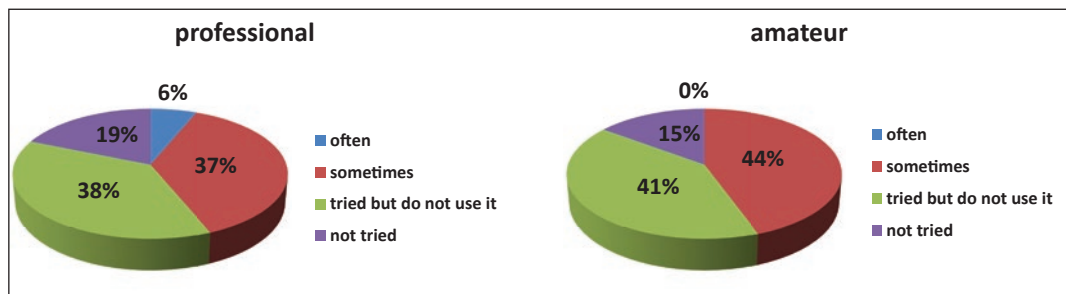


Figure 3. Responses on a question: “Do you use the HDR technique in your work and how often?”

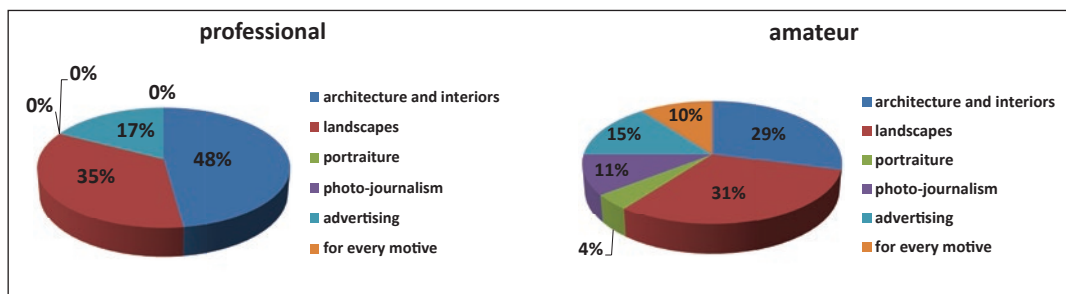


Figure 4. Responses on a question: “For what field of photography do you think HDR is most applicable technique?”

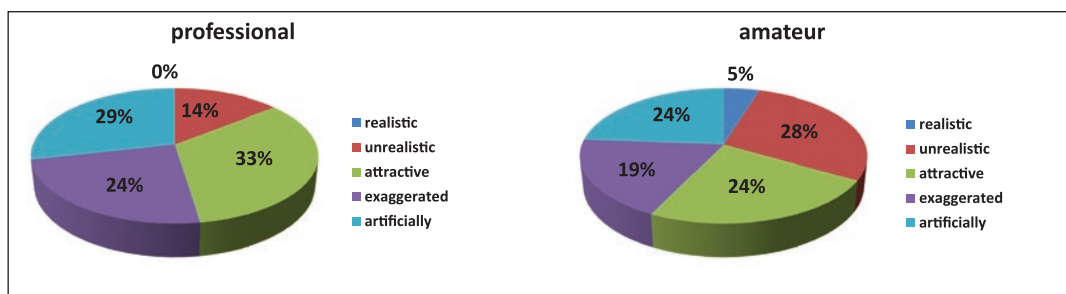


Figure 5. Responses on a question: “When comparing HDR photograph with conventional (single exposure) photograph of the same (or similar) subject, it looks more realistic, unrealistic, attractive, exaggerated, artificially”





Figure 6. Same HDR image differently tone mapped

aggressive tone mapping can produce extreme local contrast with halos, very saturated colors, noise and muddy textures. But this process of tone mapping and other post-corrections and adjustments entirely depends on the photographer's intent and vision, as well as on his mastery and understanding of various adjustments available. The HDR photography does hence not have to look exaggerated and fake. It is a matter of taste and measure. An example is shown in Figure 6.

Another widely spread misconception is that the HDR technique can be used in any situation and for every scene and subject. For low contrast scenes, like when shooting on an overcast day with dull highlights and soft shadows, there is no need for the HDR technique. Furthermore, the moving subjects are not suitable for HDR capture, because one takes several photos of the same scene with varying exposures. Capturing moving objects with this technique can cause problems in post processing known as 'ghosting' – objects appear semi-transparent. Example of ghosting is shown in Figure 7. There are some methods and algorithms for deghosting (Khan et al., 2006; Jacobs, 2008; Reinhard et al., 2010) which good results can be achieved with, but they are not applicable in all situations.

This technique proved to be useful for architecture photography, where it is possible to balance a wide range of luminance, e.g. when shooting interiors with windows without using complex lighting equipment. It can be used to solve lighting problems, rather than to provide unreal effects that distort tonal values. It is also useful for taking photographs of landscapes in

cases when the GND filter cannot fit the scene, and when it is not possible to get correctly exposed image from only one RAW photograph. Another example of a useful application of the HDR technique is when it is necessary to enhance the texture of objects, or when the main purpose of photographs is to illustrate a service or a product, like it is often needed in advertising.



Figure 7. Ghosting artifacts

One of the misconceptions is that converting a single RAW, TIFF or even a JPEG image into a 32-bit HDR file would create a HDR image. The truth is that it is possible to carry out a conversion, but it does not create a greater dynamic range than the file already contains. The process will not add details in shadows that were not there already, or recreate the highlights that were blown out. The belief that the HDR technique is automatic is yet another common misconception. To get a good HDR image takes a lot more than just processing it while retaining everything at its default settings. Each image needs to be custom processed. This could be very time consuming but also rewarding if done properly.

## 4. Conclusion

One of the respondents who filled in the questionnaire made a nice comparison regarding the use of the HDR technique. He said: *"It's like driving a fast car. No use of 500 kw if you didn't go to the driving school"*. Creating a good HDR photography is a technique that has to be learned. As the case is with all new methods and techniques, there is an evolution of use. The graph in Figure 8. made by Francisco Imai clearly shows the current stage of understanding and acceptance of the HDR imaging techniques among photographers (Imai, 2010). Photographers first experiment (i.e. use to extreme) and eventually, with time, gain the experience and knowledge to accept more subtle and refined final images. When they learn how and when to use it, then they can go back to taking good photographs focusing on the subject and the story they want to tell. If the HDR technique could help to tell that story, then let it be.

This preliminary investigation was conducted to get some objective data about the use of HDR technique among Croatian photographers. The results gained will serve as a base for the future research planned for monitoring the implementation of these techniques in the professional photography and performance analyses.

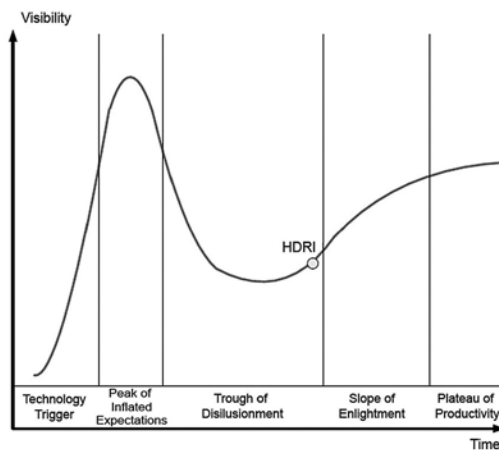


Figure 8. Hype Cycle HDRI (Imai, 2010)

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